

The Canadian Entomologist

LXI.

ORILLIA, NOVEMBER, 1929.

No. 11.

NEW SPECIES AND NEW RECORDS OF ARADUS (ARADIDAE, HEMIPTERA).*

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This paper is intended to bring up to date our knowledge of the North American species of Aradus, and it is supplementary to my Essay on this group published in 1921. (Trans. American Ent. Soc., XLVII: 1-106, pls. I-VII.) It is based largely on Canadian material sent to me by Dr. J. McDunnough, William J. Gerhard, and W. Downes. Although collectors have shown a considerable interest in the genus, very few new species have come to light; and so it seems likely that our knowledge in this direction is nearly complete. However, those who have access to collecting grounds which are comparatively unmarked by civilization may still discover new forms; and their activities are the more to be urged, since these insects are undoubtedly becoming extinct, as forests disappear and suitable habitats are more and more restricted.

The following list puts on record new ecological data and the descriptions of two new species and one new subspecies, as well as several new pterygopoly-morphic phases. The numbering corresponds to that adopted in my Essay. I have not repeated here the numerous new state records and host-plant notations given by Blatchley in his "Heteroptera of Eastern North America." He describes one new species, *Aradus brunnicornis*, related to *A. lugubris*, from Florida and North Carolina. I have not seen it. Van Duzee has recently described *A. leachi* from California (Pan-Pacif. Ent. v, 186, 1929).

Aradus quadrilineatus Say. (11).

NEW BRUNSWICK: Fredericton, June 21, 1928 (M.L.P.).

ALBERTA: Banff, June 10, 1928 (Owen Bryant), under spruce bark.

Aradus inectus Parsley. (12).

MANITOBA: Aweme, June 3, 1920 (N. Criddle), Sept. 19, 1922 (R. M. White).

Macropterous form.—Similar to the brachypterous form except as follows: Postero-lateral margins of pronotum somewhat rounded. Hemi-elytra (♀) parallel beyond middle, extending almost to apex of genital lobes, exposing about two thirds of width of connexivum at middle of abdomen. An intermediate example (hemibrachypterus ♀) has the hemielytra narrowed evenly toward apex, extending to middle of pregenital segment; corium slightly reduced, scarcely twice as long as scutellum. Length 5-6 mm.

Formerly only the two type specimens of this species were known, one of which I borrowed for comparison with these new specimens through the kindness of Dr. P. P. Babiy of Cornell University. In fresh material the color proves to be almost uniform black, the pale markings even less conspicuous than in the holotype.

*—Contribution from the Department of Zoology, Smith College, No. 158.

Aradus proboscideus Walker. (19).

ALBERTA: Banff, July 1, 1925 (Owen Bryant).

Aradus acutus Say. (32).

MANITOBA: Aweme, April 18, 1922 (R. M. White).

***Aradus paganicus* sp. nov.**

Description.—Light brown; head, antennae, legs, anterior lobe of pronotum except margins, basal third of scutellum, membrane, and dorsum dark brown and more or less supplied with pale granules, the infuscation variable in extent; transverse sutures of connexivum and genital lobes inconspicuously pale; ventral surface of abdomen light brown, with variable darker markings.

Head longer than broad (36 to 28), longer than pronotum (36 to 30); tylus rather large, bulbous; impressions of vertex short, shallow, slightly divergent; preocular tubercles distinct; antenniferous spines small, moderately divergent, lateral tooth minute; postocular tubercles distinct, blunt; antennae (fig. 1b) moderately slender, clavate, somewhat shorter than head and thorax together (58 to 66), the first segment reaching middle of tylus, second longer than width of head including both eyes (30 to 28); rostrum reaching behind middle of mesosternum. Pronotum (fig. 1c) rather flat, widest well behind middle; lateral margins slightly reflexed; anterior lobe moderately convex, with two tubercles; transverse impression distinct; carinae slightly elevated. Scutellum pentagonal, equal in length to pronotum, discal elevation U-shaped, sides scarcely elevated behind middle. Hemielytra (δ) extending to genital lobes, narrowed enough to expose connexival suture from second segment, corium extending to middle of fourth; (φ) short, extending to anterior margin of sixth segment, strongly narrowed, exposing disc of abdomen broadly at sides, corium extending scarcely to fourth segment; basal expansions moderate, slightly reflexed, transverse veins numerous, membrane narrowly rounded at apex.

Genitalia similar in type to those of *acutus*. δ . Fifth ventral segment longer than sixth. Length 8.8.5 mm.

φ . Dorsal genital segment twice as long as broad, posterior margin curved, truncate at middle; genital lobes distinctly narrower than in *acutus*, inner margins rounded. Length 9.9.5 mm.

Holotype.— φ ; Kelowna, British Columbia, January 19, 1923 (W. Downes); No. 3078 in the Canadian National Collection at Ottawa.

Allotype.— δ ; same data, in my collection.

Paratypes.— δ and φ ; same data, and Penticton, British Columbia, January 23, 1925 (W. Downes), in the National Collection at Ottawa, Cornell University collection, Downes' collection, and in mine.

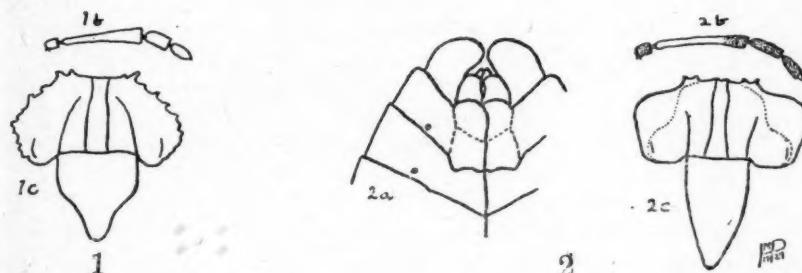
This species is somewhat similar in general appearance to *blaisdelli* Van Duzee, but it is structurally related more closely to *acutus* Say. From the former it is distinguished by its smaller size, shorter second antennal segment, and pronotal shape; from the latter by its lighter coloration, pronotal structure, and scutellar shape. It runs to 35 in the Essay key, where it is readily distinguished from *opertaneus* Parshley by size and antennal structure and from *acutus* as noted.

Mr. W. Downes writes as follows concerning the circumstances under which he discovered the specimens on which this new species is based: "They were

taken under bark of *Pinus ponderosa* and were found hibernating principally under the outer bark scales near the ground where they would be protected by snow, although a few were found under loose bark higher up the trees. It appears to be quite a common species on these trees, but has a preference for dying trees on which a certain kind of white mould is developing in or under the bark."

***Aradus gracilis* sp. nov.**

Description.—Light brown, with paler, yellowish markings; antennae dark brown, the basal three fourths of second segment yellow; head, scutellum, and pronotum except carinae and expanded margins, dark brown; corium dark, the basal expansions and veins light; membrane spotted with brown, the veins with hyaline borders; posterior angles of connexival segments pale, the sutures faintly so; genital lobes (♀) pale in posterior half; rostrum and legs brown; median area of ventral surface dark.



Head slightly longer than broad (39 to 37), as long as pronotum; tylus moderate in size, parallel; impressions of vertex narrow, small, divergent; preocular tubercles small, obtuse, but distinct; antenniferous spines very short, moderately divergent, with rudimentary lateral tooth; postocular tubercles rounded, obsolescent; antennae (fig. 2b) very slender, about as long as head and thorax together, the first segment reaching beyond middle of tylus, the second in length equal to width of head including both eyes, moderately enlarged at apex; rostrum just reaching mesosternum. Pronotum (fig. 2c) uneven, lateral margins broadly reflexed (outside dotted line), entire, with very fine denticulation; carinae distinctly elevated; anterior lobe slightly elevated, granulate; transverse impression moderate; posterior lobe polished, transversely rugulose between carinae. Scutellum (fig. 2c) elongate triangular, distinctly longer than pronotum (50 to 39), sides slightly curved, strongly elevated to tip, disc with distinct elevation extending to middle. Hemelytra (♀) extending to genital lobes, moderately narrowed, exposing connexivum; corium extending nearly to middle of fifth abdominal segment, the basal expansion moderately reflexed, nearly straight at middle; transverse veins numerous; membrane broadly rounded at apex. Abdominal margins very slightly notched.

♀. (fig. 2a). Genital lobes large, curved; genital area of sixth ventral segment with oblique elevated line on each side (dotted in fig.); abdomen oval, moderately broad, much wider than pronotum (105-75). Length 7.5 mm.

Holotype.—♀; Banff, Alberta, May 30, 1922 (C. B. D. Garrett) in my collection.

I am indebted to Mr. William J. Gerhard for sending me the single specimen on which this beautiful and striking species is based. It is not closely related to any other and must constitute a new group in the genus, which may follow the *similis* group. *A. gracilis* may be readily distinguished by its light coloration, slenderly clavate and bicolored antennae, broadly expanded pronotum, and long narrow scutellum. It runs to 43 in the Essay key, where it is distinguished by having the pronotum broadest before the middle, etc. The type specimen lacks the right hemelytron.

Aradus compressus Heidemann (37).

BRITISH COLUMBIA: Victoria, September 22, 1923 (W. Downes); Vancouver (Bush).

Brachypterous form.—Pronotum reduced in size and somewhat flattened, widest at base, twice as wide as head, much shorter than head (34 to 50); carinae low; lateral margins reflexed, rather straight and oblique, less strongly sinuate than in macropterous; posterior margin strongly emarginate before scutellum, the posterior lobes scarcely depressed. Margins of scutellum thickened, slightly elevated. Hemelytra extending to apex of second abdominal segment, rounded at apex, not meeting beyond scutellum; corial veins distinct, membrane vestigial, not extending beyond apex of corium; width across basal expansions almost equal to that of macropterous.

Aradus borealis Heidemann (38).

QUEBEC: Kazubazua, July 19, 1927 (G. S. Walley).

Aradus abbas Bergroth (47).

ALBERTA: Nordegg, July 30, 1921 (J. McDunnough).

Aradus insolitus Van Duzee (57).

ALBERTA: Edmonton, March 25, April 28, 1925 (Owen Bryant).

Aradus nigrinus Parshley subsp. ***canadensis*** subsp. nov.

Description.—Black, with extremely obscure pale markings on pronotum, scutellum, corium, and connexivum.

Similar in structure to *nigrinus* except as follows: Tylus slightly longer, extending to basal fifth of second antennal segment. Pronotal margins irregularly and very minutely toothed. Antennae but slightly thicker than front femora. Hemelytra (♀) extending to or halfway over dorsal genital segment. Length 5.5-6 mm.

Holotype.—♀; Banff, Alberta, August 8, 1925, Cascade Mt. 7000-8000 ft. (Owen Bryant), in my collection.

Paratype.—♀; same data, in Bryant's collection.

This form is represented by two specimens sent to me by Mr. William J. Gerhard. I find it impossible to overlook the features in which these Alberta specimens differ from the type of *nigrinus*, from Arizona. The differences, slight though they are, in antennal thickness, pronotal margins, color, size, and locality appear to justify subspecific or racial separation.

Note.—In the original description of *A. nigrinus* (Essay, p. 101) the length of the holotype is stated incorrectly. It should read 6.6 mm. instead of 7.6 mm.

A LIST OF THE CRANE-FLIES OF QUEBEC (DIPTERA.) I

BY CHARLES P. ALEXANDER,

Amherst, Massachusetts.

(Continued from page 236)

Limonia (Dicranomyia) nycteris (Alex.) Gaspé, north shore, July 1-5, 28 (GCC). Known hitherto only from Alberta.

Limonia (Dicranomyia) profunda (Alex.) Gaspé, south shore, June 26-July 1, 28 (GCC).

Limonia (Dicranomyia) pudica (O.S.) Montreal, July (GB); Rigaud, June (GC).

Limonia (Dicranomyia) sphagnicola Alex. Maniwaki, June 25, 25 (CHC); Gaspé, north shore, July 1-5, 28 (GCC).

Limonia (Rhipidia) maculata (Mg.) Chambley Co., Sept. (GB); Rigaud, June (GB); Aylmer, June (JIB), Sept. 28, 24 (CHC); Megantic, July 6, 16.

Limonia (Discobola) argus (Say) Wakefield, July 26 (FPI); St. Hilaire, June 27, 16; Aylmer, Aug. 8, 24 (CHC), Sept. 4, 24 (GSW).

Antocha saxicola O.S. (records confused with *opalizans* O.S.) Montreal, June-Sept. (AFW); Gatineau, July (GB) Coaticook, Sept. (JIB); Lachine, June 16, 25 (FPI); Covey Hill, June 17-21, 24 (GSW).

Helius flavipes (Macq.) Montreal, June-Aug. (GC); Ottawa Golf Club, Aug. 13, 24 (FPI); Coaticook, June (JIB); Hull, July (JIB); Wakefield, July 14, 26 (GSW).

Pediini

Pedicia albivitta Walk. Quebec, (TWF); Gatineau, July (GB); Aylmer, June (GB).

Tricyphona autumnalis Alex. (as *calcar* O.S. in the W.B. List). Meach Lake, Sept. (TWF); Sept. 2, 03 (J. Fletcher)

Tricyphona calcar (O.S.) Stoke Center, June (AFW); Gaspé, south shore, June 26-July 1, 28 (GCC).

Tricyphona hyperborea (O.S.) Seven Islands, July 18, 24 (FWW).

Tricyphona inconstans (O.S.) Aylmer, June (JIB), Aug. 24, 24 (CHC); Rigaud, July 27; Broadview, May 27, 25 (FPI); Gaspé, both shores, June 26-July 5, 28 (GCC).

Amalopina flaveola (O.S.) Wakefield, June 14, 26 (FPI); Gaspé, south shore, June 26-July 1, 28 (GCC).

Dicranota noveboracensis Alex. Wakefield, June 14, 26 (FPI).

Dicranota iowa Alex. Aylmer, May 10, 25 (CHC).

Rhaphidolabis (Plectromyia) confusa Alex. Gaspé, south shore, June 26-July 1, 28 (GCC).

Rhaphidolabis (Rhaphidolabis) rogersiana Alex. Gaspé, north shore, July 1-5, 28 (GCC). Known hitherto only from Michigan.

Hexatomini

Ula paupera (O.S.) Gaspé, north shore, July 1-5, 28 (GCC).

Epiphramma fascipennis (Say). Montreal, June (GB); Wakefield, June 14, 26 (FPI); Gaspé, both shores, June 26-July 5, 28 (GCC).

Dactylolabis montana (O.S.) Province of Quebec (O.S.); Wakefield, June 14, 26 (FPI).

Pseudolimnophila contempta (O.S.) Ottawa Golf Club, Aug. 13, 24 (FPI); Coaticook, Sept. (JIB).

Pseudolimnophila toxoneura (O.S.) Megantic, July 6, 16.

Limnophila (Lasiomastix) macrocera (Say) Montreal, June (GB).

Limnophila (Lasiomastix) tenuicornis O.S. Ottawa Golf Club, June 4, 26 (FPI); Aylmer, June 3, 24 (CHC).

Limnophila (Phylidorea) adusta O.S. Province of Quebec (O.S.); Montreal, Sept. (JIB).

Limnophila (Phylidorea) similis Alex. Gaspé, south shore, June 26-July 1, 28 (GCC).

Limnophila (Phylidorea) terrae-novae Alex. Gaspé, north shore, July 1-5, 28 (GCC).

Limnophila (Prionolabis) munda O.S. Montreal, June (GC); Gaspé, north shore, July 1-5, 28 (GCC).

Limnophila (Prionolabis) rufibasis O.S. Montreal (GC); St. Johns Co., June (GC); Rigaud, June (GB); Hemmingford, May 24, 25 (GHH); Gaspé, south shore, June 26-July 1, 28 (GCC).

Limnophila (Dicranophragma) fuscovaria O.S. Montreal, June (GB); Ottawa Golf Club, Aug. 25, 24 (FPI); Rigaud, June (GC); Covey Hill, June 18, 24 (GSW).

Limnophila areolata O.S. Megantic, July 6-7, 16; Gaspé, north shore, July 1-5, 28 (GCC).

Limnophila brevifurca O.S. Province of Quebec (O.S.); Broadview, May 27, 25 (FPI).

Limnophila poetica O.S. Aylmer, May 29, 24 (CHC).

Limnophila unica O.S. Gaspé, north shore, July 1-5, 28 (GCC).

Pilaria imbecilla (O.S.) Aylmer, June, July (JIB).

Pilaria quadrata (O.S.) Montreal, June (AFW); St. Johns Co., May, June (GC); Gatineau, July (GB); Hull, June (JIB); Gaspé, south shore, June 26-July 1, 28 (GCC).

Pilaria tenuipes (Say). Montreal, Aug. (GC).

Shannonomyia lenta (O.S.). Aylmer, June 15, 24 (CHC).

Eriocera spinosa O.S. Wakefield, July 27, 26 (FPI); Covey Hill, July 21 (CEP).

Hexatoma megacera (O.S.) Covey Hill, June 20, 24 (GSW).

Elephantomyia westwoodi O.S. Province of Quebec (O.S.); Megantic, July 6, 16.

Eriopterini

Neolimnophila ultima (O.S.) Province of Quebec (O.S.).

Chionea valga Harris. Compton, Coaticook River, March 1, 1839 (T. H. Gosse). See Gosse, The Canadian Naturalist, 1840: 1-360.

Gnophomyia tristissima O.S. Montreal, June (GC); Rigaud, June (GB); Wakefield, July 27, 26 (FPI); Kirks Ferry, Aug. 5, 25 (GSW).

Gonomyia (Gonomyia) noveboracensis Alex. Gaspé, south shore, June 26-July 1, 28 (GCC).

Gonomyia (Gonomyia) subcinerea (O.S.) Gatineau, July (GB); Aylmer, June (JIB).

Gonomyia (Gonomyia) sulphurella (O.S.) Ottawa Golf Club, Aug. 14, 24
(FPI).

Helobia hybrida (Mg.) Montreal, June (GC); Hull, July (JIB); Broad-
view, May 5, 25 (GSW).

Cryptolabis paradoxa O.S. Wakefield, July 14, 26 (GSW).

Ormosia deviata D. etz. Gaspé, south shore, June 26-July 1, 28 (GCC);
Aylmer, Sept. 14, 24 (CHC).

Ormosia cramptoniana sp. n.

General coloration dark; wings with a grayish suffusion, the stigma and narrow seams along the cord and vein Cu darker; cell 1st M_2 small, closed; $m\text{-}cu$ shortly before the fork of M ; vein 2nd A sinuous.

Female.—Length, about 7.5 mm.; wing, 7.6 mm.

Described from alcoholic material.

Rostrum and palpi black. Antennae dark brown throughout. Head dark.

Pronotum dark, the anterior lateral pretergites abruptly pale whitish. Mesothorax dark, presumably pruinose in dry specimens. Halteres with the stem dusky, the knobs whitened. Legs with the coxae dark brown; trochanters yellow; femora obscure yellow, the tips narrowly darkened; tibiae brownish yellow, the tips narrowly infuscated; tarsi dark brown. Wings with a grayish suffusion, the base and costal region somewhat more yellowish; stigma darker, more intense along the veins; narrower and paler dark seams along the cord and Cu_1 ; veins dark. Venation: R_2 some distance before the fork of R_{3+4} ; cell 1st M_2 closed, small, the lower face not longer than $m\text{-}cu$; veins beyond the cell correspondingly elongated; $m\text{-}cu$ just beyond the fork of M ; vein 2nd A gently sinuous.

Abdomen dark brown, the ovipositor yellowish horn-color.

Habitat.—Quebec (Gaspé).

Holotype, female, north shore, July 1-5, 1928 (G. C. Crampton).

Type in author's collection.

Ormosia cramptoniana is named in honor of the collector, Dr. G. Chester Crampton, who has added materially to our knowledge of the Tipulidae of Gaspé. It is the largest species of the genus so far discovered in north-eastern North America, allied to *O. nubila* (O.S.), differing especially in the wing-pattern, which is here restricted to seams along the cord and vein Cu .

Ormosia gaspensis sp. n.

General coloration dark brown; antennae (male) relatively short, ending shortly before the wing-root; wings with a strong dusky suffusion; cell M_2 open by the atrophy of m ; cell M_3 short and wide; vein 2nd A nearly straight; male hypopygium with the inner dististyle short, the apex expanded into a weakly bilobed head.

Male.—Length, about 3.2 mm.; wing, 4.2 x 1.6 mm.

Described from alcoholic material.

Rostrum and palpi black. Antennae (male) relatively short, if bent backward extending nearly to the wing-root, dark brown throughout; flagellar segments oval. Head dark brown, possibly pruinose in dry individuals.

Pronotum brown; anterior lateral pretergites pale whitish. Mesonotal praescutum light yellowish brown with three dark brown stripes that cover most of the disk; scutal lobes similarly darkened; scutellum obscure brownish yellow;

postnotum dark. Pleura dark brown. Halteres pale, the knobs a little darkened. Legs with the coxae dark brown, the trochanters paler; remainder of legs dark brown, the femoral bases a trifle brighter. Wings with a strong dusky suffusion, the prearcular costal area brighter; stigmal region a little more suffused; veins darker brown. Venation: Cell M_2 open by the atrophy of m ; cell M_3 relatively short and wide at margin, wider than M_2 or M_4 ; vein 2nd A nearly straight, diverging from 1st A .

Abdomen dark brown, the hypopygium a very little brighter. Male hypopygium with the outer dististyle complex, irregularly bifid, the outer arm longer, narrowed to the obtusely rounded apex, the inner margin densely set with series of peg-like spines; inner arm much shorter, obtusely rounded, the outer face similarly densely set with abundant peg-like spines. Inner dististyle very stout and relatively short, the apex expanded into a head that is weakly bilobed, provided with setae. Aedeagus subtended by a very extensive and conspicuous phallosomic structure, the distal end appearing as wide flaring plates on either side of the aedeagus.

Habitat.—Quebec (Gaspé).

Holotype, male, north shore, July 1-5, 1928 (G. C. Crampton).

Type in author's collection.

Ormosia gaspensis is a very distinct species, differing from all known species in the structure of the male hypopygium. The venation, with cell M_2 open by the atrophy of m and the short cell M_3 , in conjunction with the darkened wings, is likewise diagnostic.

Ormosia meigenii (O.S.) Gaspé, south shore, June 26-July 1, 28 (GCC).

Ormosia monticola (O.S.) Rouville Co. (GC).

Ormosia nigripila (O.S.) Gaspé, north shore, July 1-5, 28 (GCC).

Ormosia notmani Alex. Gaspé, north shore, July 1-5, 28 (GCC).

Psiloconopa gaspicola Alex. Gaspé, south shore, June 26-July 1, 28 (GCC); type-locality.

Erioptera (Hoplolabis) armata O.S. Province of Quebec (O.S.); Hull, June 5, 26 (CHC); Wakefield, Aug. 21, 25 (FPI); Aylmer, June 3, 24 (CHC); Gaspé, south shore, June 26-July 1, 28 (GCC).

Erioptera (Ilisia) armillaris O.S. Province of Quebec (O.S.).

Erioptera (Ilisia) venusta O.S. Coaticook, Sept. (JIB).

Erioptera (Erioptera) chlorophylla O.S. Province of Quebec (O.S.).

Erioptera (Erioptera) chrysocoma O.S. Province of Quebec (O.S.).

Erioptera (Erioptera) gaspeana sp. n.

Belongs to the *chlorophylla* group, most closely allied to *chlorophylla* O.S., differing notably in the structure of the male hypopygium.

Male.—Length, about 5 mm.; wing, 5 mm.

Female.—Length, about 6 mm.; wing, about 6.5 mm.

Described from alcoholic material.

Eyes of male large and protuberant, narrowly contiguous on the ventral surface, the anterior vertex relatively narrow. In the female, the eyes narrowly separated on ventral surface. General coloration pale chlorophyll green, the color paling in alcohol. Male hypopygium with the inner apical angle of the basistyle a little produced, setiferous. Outer dististyle relatively slender, pale,

the apex and margin of the narrow blade more dusky; apex of style narrowly obtuse. Inner dististyle much shorter, appearing as a gently arcuated pale blade, the apex dusky, bent at an angle and produced into a small black terminal spine. Gonapophyses appearing as gently curved black horns, the distal half of each blackened; inner apophyses appearing as strongly bent pale rods, their apices directed strongly cephalad. What may represent the tergite appears as a pale transverse plate, the lateral lobes slightly more produced and provided with long coarse setae, the more chitinized median area not extending quite as far caudad, separated from the broader lateral lobes by small notches. Ovipositor with the tergal valves elongate, slender, rather strongly upcurved, the margins smooth.

Habitat.—Quebec (Gaspé).

Holotype, male, south shore, June 26-July 1, 1928 (G. C. Crampton).

Allotopotype, female.

Paratopotype, female.

Types in author's collection.

Erioptera gaspeana is most closely allied to *E. chlorophylla* O.S. in the general structure of the male hypopygium but differs in several important respects.

Erioptera (Erioptera) septentrionis O.S. Montreal, July (G.B); Ottawa Golf Club, Aug. 14, 24 (FPI); Aylmer, June (JIB); Hull, June 15, 23 (CHC); Megantic, June 18, 23 (CHC).

Erioptera (Erioptera) vespertina O.S. Montreal, July (GB); Ottawa Golf Club, Aug. 14, 24 (GSW).

Erioptera (Mesocyphona) caloptera Say. Montreal, June (GC).

Erioptera (Mesocyphona) needhami Alex. Aylmer, June 15, 24 (CHC).

Erioptera (Gonempeda) nyctops Alex. Megantic, June 18-20, 23 (CHC).

II. NEW COLEOPTERA FROM WESTERN CANADA.*

BY RALPH AND GEO. R. HOPPING,

Vernon, B. C.

Several years ago Mr. H. C. Fall asked to see our *Podabrus*. A number were returned with MSS. names upon them, but Mr. Fall did not seem anxious to publish at that time and in fact did not publish until a year or two later.

No mention is made in the preface of having studied our material, although later under the several species are many references to specimens and localities in our collection.

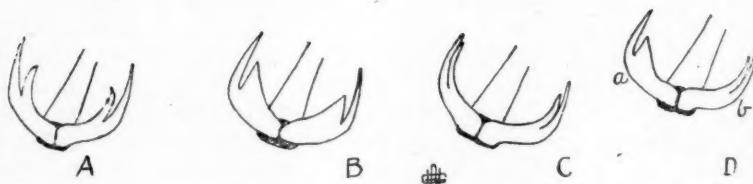
The specimens with Mr. Fall's manuscript names upon the pins could probably be considered as paratypes, although they are not so marked by him.

In working up the species collected in British Columbia, since the return of our material, we have found that no matter how good the description of the characters of the tarsal claws, it was rather hard to visualize them. The drawings accompanying this paper may help other students to classify their material.

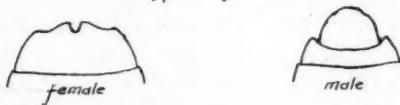
They illustrate the tarsal claws and the last ventral abdominal segments in the groups set forth in Mr. H. C. Fall's paper in *Entomologica Americana*, Vol. VIII, No. 2, 1927, p. 66.

*—Contribution from the Entomological Branch, Dept. of Agriculture, Ottawa, Ont.

In Fall's first group, the claws of both sexes are as in figure A; in the second group as in figure B; in the third group, the male with all claws as in figure C, the female with all claws as in figure B; the fourth group, the male with front and middle claws as in figure C, the hind claws as in figure B, the female with all claws as in B; the fifth group, the male with front claws as in figure C, middle and hind claws as in figure B, the female with all claws as in B; the sixth group, the male with front claws as in figure C, the middle claws as in figure D (the outer claw being "a"), the hind claws as in figure B, the female with all claws as in figure B; the seventh group, the male with front and the middle claws as in figure C, the hind claws as in figure D (the outer claw being "a"), the female with all claws as in figure B.



Types of tarsal claws in *Podabrus*.



General type of last ventral abdominal segment.

Podabrus fissilis Fall.

This species was described from a single pair taken at Emerald Lake, B. C. by Dr. Fenyes and one specimen taken in Alaska by Mr. Fall. Recently a large series was given us by Mr. H. C. Hughes, collected at the Emerald Mine in the Coast Range south of Prince Rupert. Most of the females are colored the same as the males but occasionally a female is almost entirely black.

Podabrus falli n. sp.

Head, prothorax, antennae, legs, and elytral bases rufo-testaceous. Elytral margins and suture narrowly rufo-testaceous, remainder of elytra black. Ventral surface of male rufo-testaceous, of the female, blackish, lighter caudally.

Front of head sparsely, coarsely punctate, the occiput and neck densely so; second joint of antennae a little over three fourths the length of the third and a little over half the length of the fourth.

Pronotum slightly broader than long, evenly rounded at the sides, finely and sparsely punctate, more densely so apically, the front angles obtuse, the hind angles slightly prominent; median line moderately impressed, faint on some specimens.

Elytra rather coarsely rugose, with two or three prominent longitudinal carinae and a fine, sparse, pale pubescence.

Front femora slightly curved and slightly enlarged apically. Tarsal claws in both sexes armed with a long acute tooth. In the male, this tooth is as long as the main claw on the front feet and nearly so on the middle and hind feet, while in the female, the tooth is considerably shorter than the claw on all feet.

Hind coxa of male without distinct apical process (*e. g. limatus*) but with the tuft of hairs common to the species of this group.

Length 11-12 mm., breadth 3-3.25 mm.

Holotype.—Male, Otter Creek, British Columbia, July 14, 1920, Ralph Hopping; No. 2982 in the Canadian National Collection, Ottawa.

Allotype.—Female, Westbank, British Columbia, July 25, 1924, same collector, in the Canadian National Collection.

Paratype.—Female, Nine Mile, Princeton, British Columbia, August 30, 1922, same collector; in the Hopping collection.

This species belongs to Fall's first group in which both males and females have tarsal claws as in A of the plate. The acute tooth in the male, however, is fully as long as the claw on the front feet and nearly so on the middle and hind feet. In the female the claws are about as in the figure. This species in Fall's key seemed to run to *P. limatus* Fall. As we had never seen *limatus* the male type was submitted to Mr. Fall who very kindly compared it with that species, and agreed with us that it was a new species. He remarks as follows: "Although the protibiae are only weakly modified in your male, they are unmistakably somewhat so and I think it may best be associated with *limatus*, in which indeed this character is also rather feebly developed. As compared with *limatus* your species is stouter, the eyes relatively smaller, and less prominent, the elytra pale at base (perhaps constant) and the hind coxae have only an apical small tuft of hair (♂) while in *limatus* there is a distinct process of the coxa itself surrounded with a tuft of hair."

Of the three specimens seen (1 ♂ and 2 ♀ ♀) the colour does not vary.

NOTES ON HOMAEMUS WITH A KEY TO THE SPECIES (HEMIP.,
SCUTELLERIDAE)*

BY G. STUART WALLEY,

Ottawa, Ont.

Of the five species of *Homaemus* recorded from America, north of Mexico, *proteus* Stal. and *parvulus* (Germ.) are confined to the southern half of United States; *variegatus* Van D. is known only from California; *bijugis* Uhl. ranges throughout middle and western United States and Canada, extending southward to Colorado, New Mexico and California; *aeneifrons* (Say) has been commonly recorded from the Atlantic to the Pacific in northern United States and Canada and has been reported from the southwest from Colorado, New Mexico and California.

Through the kindness of Dr. H. H. Knight, Dr. E. P. Van Duzee, Mr. W. Downes and Mr. E. McMillan, the writer has had the opportunity of studying representatives of all the above mentioned species.

*—Contribution from the Division of Systematic Entomology, Entomological Branch, Dept. of Agric., Ottawa.

A study of the male genitalia of the above species has not revealed characters of great value in the separation of species. However, a study of a long series of *aeneifrons* has disclosed characters correlated with an eastern and western distribution and a new western sub-species is described below.

The following key will serve to separate the species recorded for America, north of Mexico.

TABLE OF SPECIES

1. Anterior margin of prostethus forming a distinct angle beneath antenniferous tubercle, when viewed vertically from below 2.
- Anterior margin of prostethus rounded beneath antenniferous tubercle 3.
2. Length 4-5 mm.; osteolar canal evenly curved, not abruptly bent at apex *variegatus* Van D.
Length 6-8 mm.; osteolar canal with apex abruptly bent as in *aeneifrons* *proteus* Stal.
3. Length 4-6 mm.; osteolar canal not abruptly bent at apex; humeri sub-acute (Southern U. S.) *parvulus* (Germ.)
Length 6-9 mm.; osteolar canal abruptly bent at apex; humeri rounded (North, Central U. S. and Canada) 4.
4. Vertex usually with a pale yellow sub-marginal stripe; sixth visible ventral segment with median anterior portion rounded *bijugis* Uhl.
Vertex without a pale yellow sub-marginal stripe: sixth visible ventral segment with median anterior portion broader and distinctly angulate 5.
5. Male with margins of apical portion of paramere, sub-parallel, the apex entire *aeneifrons* (Say).
Male with margins of apical portion of paramere, converging to apex which bears a small emargination *aeneifrons extensus* n. sub-sp.

Homaemus proteus Stal.—A southern species possessing several well marked color varieties. Two specimens are at hand, one from Wharton, Texas (H. H. Knight), the other from eastern Florida (Ashmead). Fig. 4 shows a ventral view of the prostethus.

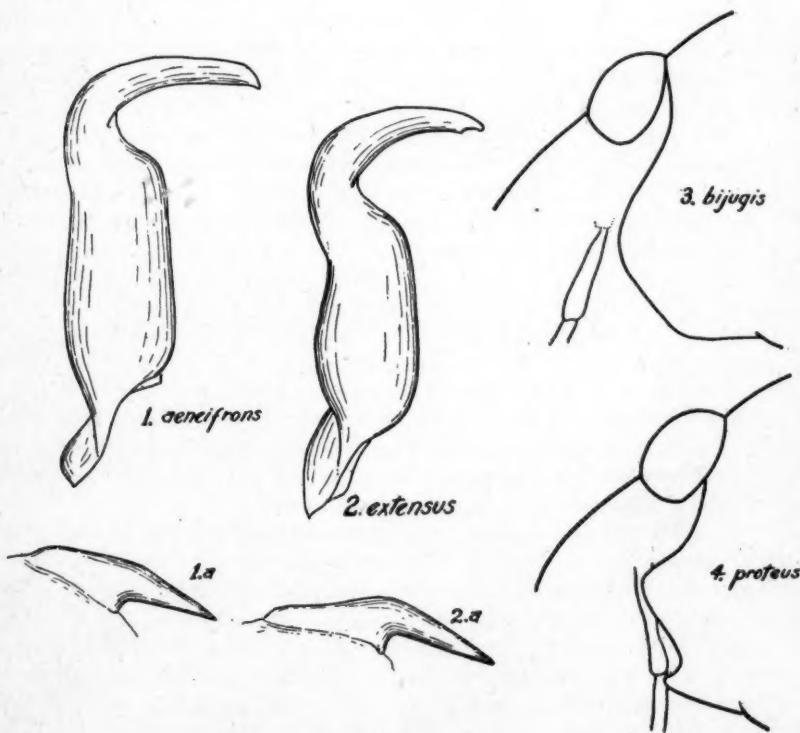
Homaemus variegatus Van D.—Material including a paratype has been examined from Mill Creek Canyon and Alpine, San Diego Co. California (Van Duzee). The angulate prostethus resembles the preceding species from which it may be distinguished by its smaller size and different color pattern.

Homaemus parvulus (Germ.)—A southern species having the appearance of a small *bijugis*. Specimens are at hand as follows: Mo.: Hollister (Knight); Fla.: Sanford (Ball); La.: Natchitoches Parish (Schmidt). *H. grammicus* (Wolff) is a synonym.

Homaemus bijugis Uhl.—A very common species in certain regions of the middle west. A series has been examined from the following localities: Minn.: (numerous localities); Mont.: Powderly, Lo Lo, Gallatin Mts., Bridger Mts.; B. C.: Arrowhead, Goldstream, Merritt, Vernon. Fig. 3 shows a ventral view of the prostethus.

Homaemus aeneifrons (Say)—A long series of *aeneifrons* has been studied. In the eastern specimens the male parameres have the apical portion as in Fig. 1. The western specimens show the emargination as in Fig. 2. The heavily

chitinized conjunctive appendages of the male are longer and more slender in the western specimens (Fig. 2a). The range of *aeneifrons* based on material at hand is as follows: CAPE BRETON I.: Cheticamp, Sept. (Johansen); MAGDALEN ISLS.: Grindstone Isl., Aug. 19 (Johansen); N. S.: Annapolis Royal, July 27 (Brown), Kentville, July 18 (Patterson); N. B.: Greys Mills, Sept. 14 (Gorham), Youghall, July 27 (Fletcher); QUE.: Aylmer, July 31 (Fisk), Kazubazua, July 17-Aug. 28 (Brown), Sherbrooke; ONT.: Chalk R., Aug. 26 (Chrystal), Norway Point, Lake of Bays, July 28 (McDunnough), Sudbury (E. P. V.); MAN.: Aweme, July 25-Aug. 2 (Cridle); SASK.: Saskatoon, July 29-Sept. 22 (King); MINN.: Baptism Creek, Lake Co., Aug. 10 (Hoffman), Cloquet, Aug. 3 (Nichol), Cramer, Aug. 10 (Hoffman), Duluth, Aug. 19 (Knight), Elkhorn Creek, Carlton Co., Aug. 18 (Knight), Grand Marais, Aug. 13 (Hoffman), Itasca Park, Aug. 4 (Person), Kawishiwi, Aug. 28 (Knight), Lake Itasca, Sept. 8, Morrison Co., July 10 (Nichol), Ottertail Co., Aug. 8, St. Peter, June 22 (Dawson), Two Harbors, Aug. 9 (Knight), Wadena, July 24 (Nichol), Willow R., Aug. 6 (Hungerford).



1. *Homaemus aeneifrons* (Say) ♂ paramere. 1a. ♂ conjunctive appendage of same. 2. *Homaemus aeneifrons extensus* n. sub-sp., ♂ paramere. 2a. ♂ conjunctive appendage of same. 3. *Homaemus bijugis* Uhl., showing prostethus. 4. *Homaemus proteus* Stal., showing prostethus.

The Minnesota specimens mentioned above are probably topotypical with

Say's material hence the name of the typical form is applied to the eastern series.

The western form of *aeneifrons* is described as follows:

Homaemus aeneifrons extensus n. sub-sp.

Resembles typical *aeneifrons* presenting the same range in size and color patterns. The abdominal sternites in both sexes less heavily punctate with punctures less conspicuously blackened than in typical *aeneifrons*. Outer angle of prostethus slightly less acute.

Male genitalia with parameres of same general form as in typical *aeneifrons* but with apical portion stouter at its base, gradually narrowed with apex bearing a small emargination. Internal conjunctive appendages long and slender, heavily chitinized.

Holotype.—♂, Vernon, B. C., Aug. 21, 1923 (D. G. Gillespie), No. 2951 in the Canadian National Collection, Ottawa.

Allotype.—♀, Ft. Norman, McKenzie River, N. W. T., Aug. 6, 1922 (C. H. Crickmay).

Paratypes.—4 ♂♂, Nordegg, Alta., July 31-Aug. 6, 1921 (McDunnough); 2 ♂♂, Athabasca, Alta., Aug. 12, 1915 (Strickland); 2 ♂♂, ♀, Ft. Norman, McKenzie R., N. W. T., Aug. 8, 1922 (Crickmay); 2 ♂♂, Vernon, B. C., June 9, July 18, 1924 (Rendell); 2 ♂♂, Crows Nest, B. C., July 26, 1926 (Dennys); Oliver, B. C., Aug. 13 (Garrett).

Specimens have also been examined from the following localities: ALTA.: Armena, July 27-Aug. 12 (Hendrickson), Waterton, July 20 (McDunnough); B. C.: Lytton, June 25 (Anderson), Lucerne Sta., Aug. 12 (Anderson), Saanich Dist., Sept. 12 (Downes); MONT.: Big Sandy, Butte, Aug. 4 (Sallee); COLO.: Poudre R. Canyon, Aug. 22 (Brown).

NOTES ON A FEW MINNESOTA COLEOPTERA.

BY FRANK C. FLETCHER,

Minneapolis, Minn., U. S. A.

The following short list with the accompanying notes is based upon a collection of some 2100 species collected by myself during the past eighteen years. My original intention was to publish a list of Minnesota Coleoptera, but lack of time renders this project not likely of accomplishment.

The purpose of this paper is to render available definite Minnesota records of certain beetles where it is thought such records would be valuable. Furthermore certain rather common species are included in order to render available definite records of food plants etc.

As it will be seen, the species enumerated are mostly the larger forms, but it is my intention in the near future to publish lists of the micro Coleoptera, beetles in which I have been more interested in the past several years, and where definite records are much needed.

It is doubtful if any State in the Union has as few published records of its Coleoptera as has the State of Minnesota. No list of any kind has ever been published, the only published records are those scattered in systematic papers on the various families or in economic papers.

The greater part of the State is in the Alleghanian faunal area of the Transition zone, and it is a feature of collections made here that there is an intermingling of Boreal and upper and lower Austral elements. We find Boreal elements such as *Upis ceramboides*, *Colymbetes sculptilis*, and *Carabus* spp., mixing with *Tetraopes femoratus*, *Eleodes tricostata*, *Diabrotica longicornis*, and *Nemognatha piezata* of more western distribution and *Trypherus latipennis*, *Lebia viridipennis*, and other species which have found their way up the valley of the Mississippi River. Minneapolis and vicinity, situated as it is on the River itself, shows well in its beetle fauna this mingling of forms.

I am responsible for all determinations herein listed.

Cicindela scutellaris v. *lecontei* Hald. with *formosa generosa* Dej. and *tranquebarica* Hbst. are fairly common at Castle Rock, near Northfield in August. In his revision of the family, Mr. Leng states with reference to the varieties *modesta* Dej. and *rugifrons* Dej. that when a net is placed over them they will often bury themselves in the sand. I can state that var. *lecontei* likewise has this disconcerting habit. Specimens taken at the same time sometimes have the humeral, lateral, and apical spots well separated, sometimes completely coalesced at the margin.

Sphaeroderus lecontei Dej. Fairly common in the wooded land of the Lake Minnetonka region. In the same woods such Molluscs as *Polygyra profunda* (Say) and *Pyramidula alternata* (Say) abound and the beetles are often found associated under logs with their empty shells.

Carabus maeander Fisch. and *serratus* Say. Both these species were quite frequently found in April and May 1915-16, either under logs or running over the burnt-over swamp land west of Lake Calhoun within the city limits of Minneapolis. This land has now been "improved" with the result that the beetles have completely disappeared from this region.

Calosoma frigidum Kby. The abundance of these beetles here is determined by the abundance of the caterpillars. At times they are very numerous even within the residence sections of Minneapolis where there are groves of trees attacked by the caterpillars. At the height of their season which here is about June 8th, the caterpillars are often so numerous that when standing in a grove of trees, the falling of their excrement on the leaves below is deceptively like the steady patter of rain drops in a shower. At such a time the beetles swarm over the trees and truly have a tremendous appetite, for when confined in cages and fed these caterpillars, it is astonishing how great a number they can put away. Indeed when they have stopped eating, which they rarely do, it appears that they kill caterpillars simply out of sheer ferocity. *Calidum* is relatively much rarer.

Dyschirius sphaericollis Say. Taken once in great numbers on June 25, 1921, along the banks of a drainage ditch near New Prague. The banks were composed of dark earth and the beetles readily took wing when pursued.

Bembidion confusum Hayw. A single specimen of this beetle was obtained on the sandy beach of Christmas lake, near Excelsior in June in company with great numbers of *littorale* (Oliv.).

B. laevigatum Say. Taken once on the muddy bank of the Minnesota River at Fort Snelling in July.

Poecilus chalcites Say. A single beautiful specimen collected in June at electric light in Minneapolis.

Badister obtusus Lec. Obtained once by sifting wet leaves on the shore of Christmas Lake in September. *Pulchellus* Lec. is common at light in Minneapolis.

Necrophorus americanus (Oliv.). In 1910-11 this species was quite common about Minneapolis, being captured in meat traps. Now rarely taken. One specimen caught flying near Duluth.

Xenodus aava (Lec.). A single specimen in a nest of *Camponotus herculeanus pennsylvanicus* DeG. in dead oak. July 25, 1920.

Phausis inaccesa Lec. One specimen taken by sweeping near Minneapolis in June.

Polemius laticornis (Say). Quite common about Minneapolis in August.

Trypherus latipennis (Germ.). Taken only once, July 16, 1922, on the Minnesota River at Fort Snelling where it was swarming by thousands on an unidentified plant. Many were mating. A species of more southern range.

Cupes concolor Westw. This peculiar beetle, ordinarily considered a rarity by collectors was taken quite abundantly at electric light in July in Minneapolis. Never collected otherwise.

Zonantes fasciatus (Melsh.). Found only at one place, at Christmas Lake, near Excelsior by sweeping in June.

Elonus basalis (Lec.) and *nebulosus* (Lec.). The former by one specimen, the latter by ten specimens at the same time and place as *Z. fasciatus*.

Vanonus wickhami Casey. One male by sifting at Christmas Lake in June. Described from Wisconsin and apparently not recorded since.

Deltometopus amoericornis (Say). A few specimens beaten from *Cornus stolonifera* Michx. in June and July near Minneapolis.

Cytinus alternatus (Say). Common and generally distributed. Found in great numbers in the city of Minneapolis, on ground where the salt water from ice-cream pails was regularly emptied.

Conotelus obscurus Er. Collected abundantly in the flowers of the Hedge Bindweed, *Convolvulus sepium* L. in July, usually in company with *Mylabris discoideus*. The beetles force their slender bodies deep down in the flowers where they eat holes in the bases of the petals. When sought in the flowers they are hard to see for only the end of the body is visible. Several found once in Aug. 1917 in the flowers of *Cirsium undulatum* (Nutt). Spreng. Minneapolis and Lake Minnetonka.

Tritoma pulcher (Say). Taken only once in July along the Minnesota River at Fort Snelling.

Mycetochara megalops Casey. Two specimens from Minneapolis and along the Minnesota River at Fort Snelling. July. Described from Indiana with query. Later recorded from Ind., Ia., and N.Y.

Eleodes tricostata (Say). A western type collected at Castle Rock. Previously recorded from Minnesota by Stoner, who in 1913 took it at Fergus Falls in the western part of the State. There are specimens in the collection of the U. of Minnesota from St. Anthony Park, Minn., and there is a specimen in the Horn collection at Philadelphia with a Wisconsin label.

Rhipidandrus flabellicornis (Sturm). A single specimen from fungus near Lake Minnetonka, Aug. 14.

Upis ceramboides (Linn). From a fleshy bracket fungus at Lake Minnetonka. August. A holarctic species, extending north to the limit of trees.

Iphthimus opacus Lec. From fungus at Christmas Lake, August.

Endecatomus rugosus (Rand). Several specimens at electric light and in fungus near Minneapolis in July.

Lyctus opaculus Lec. Beaten in great numbers from *Vitis cordifolia* Michx. in June near Minneapolis.

Euryosphindus hirtus Lec. A single specimen collected at Christmas Lake in July. Described from Detroit, Mich. Recorded from S. W. Pennsylvania by Hamilton and Ohio by Dury. These are the only records I can find.

Leptura chrysocoma Kby. A single specimen from Itasca Park in July. A northern form also recorded from California.

Batyleoma suturale (Say). Common about Minneapolis in July on the flowers of *Rudbeckia hirta* L.

Psenocerus supernotatus (Say). Very abundant on and breeding in *Parthenocissus engelmanni*, covering side of house in Minneapolis. Also collected in same month at Lake Minnetonka, Chaska, and Winona.

Lepturges facetus (Say). One specimen by sweeping herbage along Minnesota River at Fort Snelling, July 16.

L. symmetricus (Hald). Minneapolis, June 27. Reared from dead elm branches, Aug. 11.

Saperda puncticollis Say. Abundant on and breeding in *Parthenocissus engelmanni* covering side of house in Minneapolis, June. Also at light.

Lema trilineata Oliv. Common about Minneapolis from June to Sept. on various *Solanaceae*. In July 1915 a planting of *Physalis Francheti* Masters was totally destroyed by this beetle.

Babia quadriguttata (Oliv.). Found in June and July at Minneapolis, Lake Minnetonka, Mankato, and Red Wing only on the staghorn Sumach, *Rhus hirta* (Linn.) Sudw., upon which it feeds. Mating on June 30.

Calligrapha lunata (Fab.). Taken only once on June 8, 1920, in Minneapolis.

Oedionychis thyamooides Crotch. Fairly common in May and June about Minneapolis and St. Paul on *Amphicarpa monoica* (L.) Ell. Mating June 11.

Disonycha crenicollis (Say). Fairly common about Minneapolis in July and August. Reared from *Vicia Cracca* L.

Anoplitis inaequalis (Web.). Common everywhere. Found on and breeds in *Amphicarpa monoica* (L.) Ell., in many parts of the State. June and July.

Chalepus scapularis (Oliv.). Occurs with the last and breeds in the same plant. July.

Physonota helianthi (Rand). Common on the various species of sunflower. Specimens have been found as early as May 2 and as late as Nov. 20th under cover, the beetles in each case being fully colored.

Mylabris discoideus Say. This pretty little beetle is to be found in July about Minneapolis and Lake Minnetonka, in the flowers of *Convolvulus sepium* L. in company with *Conotelus obscurus*. I suspect that it breeds in this plant.

M. calvus Horn. Reared from *Vicia Cracca* L. in July about Minneapolis.

Eupsalis minuta Drury. This interesting weevil is generally distributed in the State. Representative localities are: Mille Lacs, Litchfield, Faribault, Minneapolis, and Lake Minnetonka. I have found it only on and breeding in the American Linden *Tilia glabra* Vent. Minnesota individuals are not lacking the pugnacious disposition ascribed to individuals of other states.

Eurymycter fasciatus (Oliv.). Only four specimens of this Platystomid were ever collected here. These were found near Lake Calhoun resting on charred stumps which were covered with small patches of white fungus. On this surface they were quite invisible, and though it took me at least two hours to collect the four, I have no doubt that I missed many. July 2, 1915.

EPHEMERELLA HECUBA EATON; DESCRIPTION OF VARIOUS STAGES. (EPHEMERIDA, BAETIDAE).

BY DAVID SHEPHERD,

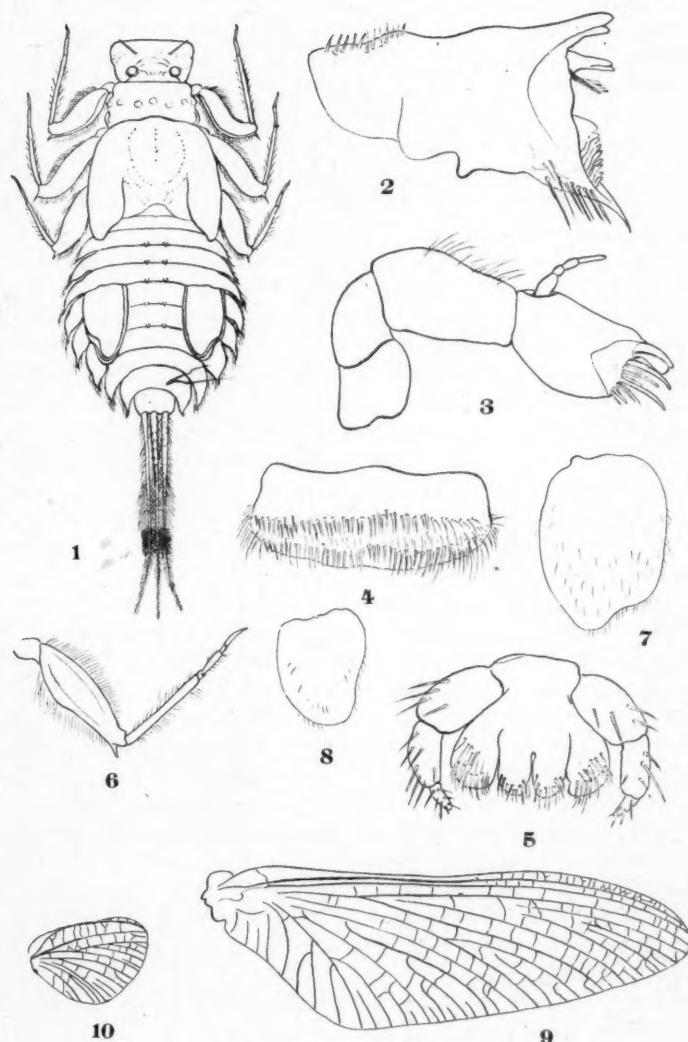
Stanford University, California.

While making a study of the aquatic fauna of Waddell Creek, Rancho del Oso, California, during the summer of 1928, the author collected, along with nymphs of several genera of Ephemerids, nymphs of *Ephemerella hecuba* Eaton figured by Eaton in his Revisional Monograph, page 133, Plate 40, figures 1-17, and by Needham in the Annals of the Entomological Society of America, volume 20, page 115, and in Bulletin 201, Utah Experiment Station, page 9. Inasmuch as the author was unable to find descriptions of the male and female imagoes in the literature he reared out adults, both male and female, in order to secure material for description. Subimagoes appeared July 11 and the imagoes issued July 12.

A description of the nymph, male imago, female imago and egg follows:

Nymph. (Plate 10, Fig. 1.). Length of body 15 mm. width in region of 5 abdominal segment 7 mm. Length of setae 7.5 mm.

Head light brown in color, small as compared with rest of body, sub-quadrangular in shape, narrower than pronotum posteriorly, wider at the cephalic margin; frons flattened anteriorly, projecting over mouth parts, truncate in front, minutely spinulose anteriorly, pilose at the sides and front, rounded off at the anterior lateral margin, posterior margin straight, narrowing posteriorly. Labrum (Plate 10, Fig. 4.) transverse, emarginated in front, rounded at the anterior corners. Compound eyes black, prominent, located in posterior lateral angles of head. Antennae inserted about mid-way between the middle of the frons and the lateral margins, long, slender; first two segments heaviest, apical three segments bearing whorls of hairs. Mandibles (Plate 10, Fig. 2.) heavy, sub-quadrangular in shape bearing, on the inner distal surface, a heavy molar surface terminating in a sharp fang like tooth, on the median anterior surface a tuft of hairs, on the outer and apical margin a pair of tooth like lobes. Apically the maxilla (Plate 10, Fig. 3) bears on the inner margin a number of light yellow setae, on the outer margin two blunt lobe-like teeth near the margin of which are two long yellow teeth. Maxillary palpi of four divisions, first segment twice as long as the second, terminal segment as long as first and second combined.



1. Nymph, dorsal view. 2. Mandible of Nymph. 3. Maxilla of Nymph. 4. Labrum of Nymph. 5. Labium of Nymph. 6. Anterior leg of Nymph. 7. First gill from right side. 8. Last gill from right side. 9. Anterior wing, ♀ imago. 10. Posterior wing, ♀ imago.

Pronotum transverse, sub-quadrangular, wider at posterior than anterior margin, gently arched and slightly flattened at the lateral margins; provided with a short conical tubercle on either side near the middle lateral margin as well as with less prominent tubercles extending across the posterior third of the segment.

Legs pilose, median coxae armed above with a short conical tubercle, femora prolonged distally into an acute spine, black band surrounding basal and apical regions of tarsi. Anterior leg (Plate 10, Fig. 6.) pilose, femur prolonged at knee into short acute spine.

Abdomen stout, wider than prothorax in region of 5th abdominal segment, narrowing anteriorly and posteriorly from this point; dorsum convex bearing blunt spines from segments 2-7; venter somewhat convex. Pleura in the form of recurved teeth, pilose in region not covered by tracheal branchiae, penultimate segment longest.

Laminae of gills (Plate 10, Figs. 7 and 8.) emarginate below the tip, the remaining laminae entire. (Plate 10, fig. 8.).

Caudal setae three in number, of equal length, median seta plumose, lateral setae lightly ciliated at the base, more heavily ciliated at the distal third; black band across the distal third of all setae.

Imago, ♂. (Plate 11, Fig. 1.) Alcoholic specimen. Length of body 15 mm. length of anterior wing 13 mm. Length of setae 10 mm.

Head mottled brown with whitish margins, occupied largely by turbinate superior portion of the compound eyes the upper portions of which are light brown the lower divisions black. Ocelli prominent, outer margins black, inner areas white. Antennae prominent, length 1.3 mm. basal segments 1 and 2 light yellow, remaining segments brown.

Pronotum sub-quadrangular, anterior margins greater in width than posterior margins, rounded at the anterior lateral margin, mottled brown, carinae reddish. Mesonotum brown in anterior median portion, reddish brown for the remainder of the posterior region. Metanotum light yellow.

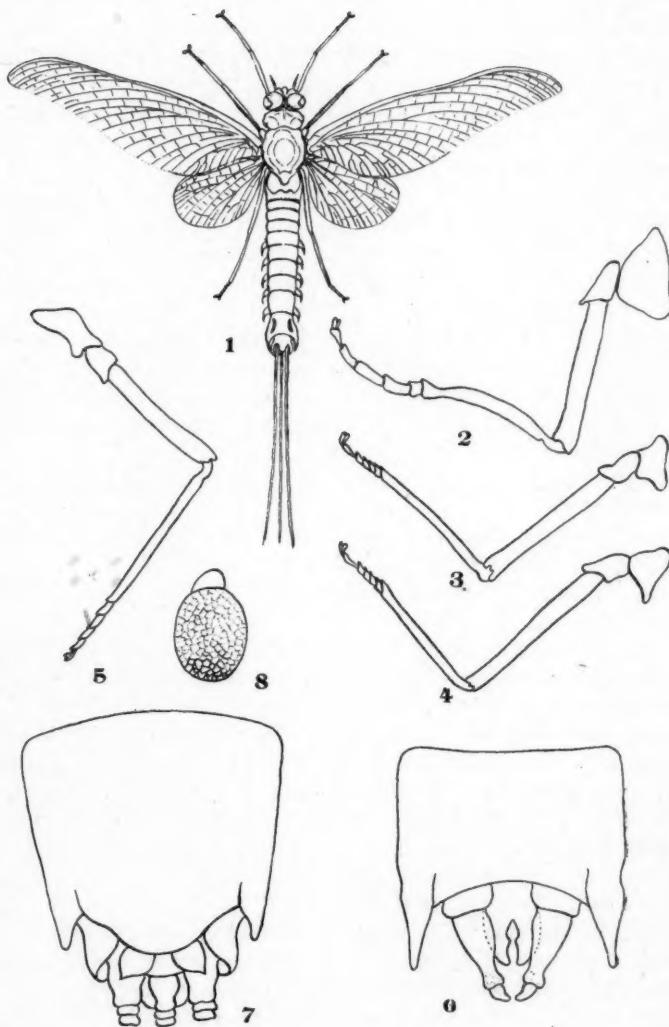
Dorsum of abdomen; first four tergites dark yellow with transverse reddish stripes which widen posteriorly and laterally in comma-shaped figures, light yellow circular spots on either side of the median portion of the tergites which increase in size and distinctness posteriorly. Remaining tergites almost entirely covered by reddish bands posteriorly, and circular white spots anteriorly, one on either side. On anterior margins of each sternite is a prominent reddish band which widens laterally almost completely covering the lateral margins of each sternite; posteriorly each sternite bears a somewhat semilunar-shaped yellow strip. Penultimate and terminal abdominal segments project laterally and posteriorly into obtuse spine-like teeth.

Persistent respiratory gills, of the nymph, filamentous, prominent dark brown almost black, borne laterally on segments 4-8.

Legs. (Plate 11, Figs. 2, 3, 4.). Anterior coxa light yellow; trochanter reddish brown ending distally in a spine like tooth; femur dark brown, margins almost black; tibia curved, notched at the anterior proximal margin, first segment of tarsi one third length of second.

Wings. (Plate 10, Figs. 9 and 10.). Semi-hyaline, neuration distinct.

Genitalia (Plate 11, Fig. 6.). Forceps light yellow, three jointed, stout, in-



1. Dorsal view, ♂ imago. 2. Anterior leg, ♂ imago. 3. Median leg, ♂ imago. 4. Posterior leg, ♂ imago. 5. Anterior leg, ♀ imago. 6. Genitalia, ♂. 7. Ventral view, penultimate and terminal segments, ♀. 8. Eggs.

termediate joint long, conspicuously constricted beyond the middle, other joints short, distal joint emarginated at posterior half. The bifurcations of penis with inner margins slightly irregular.

Imago. ♀. Alcoholic specimen. Length 16.5 mm. Length of anterior wing 18 mm. Length of setae 16 mm.

Head fulvo-aeneous with lighter margins, a fuscous semi-circular spot extending over lateral median region posteriorly to base of antennae. Vertex fulvo-aeneous. Ocelli white somewhat stalked, bases fuscous. Antennae 9 mm. in length, basal segment fuscous, remaining segments lighter brown. Compound eyes of a light purplish hue.

Pronotum fulvo-aeneous with a broad, irregular, median, transverse fuscous band and a thin black line extending around the lateral and posterior margins. Mesonotum fulvous, metanotum dark olivaceous.

Abdomen above dull olivaceous with irregular lighter green spots on segments 1-8 extending from the median portions of the segments almost to the lateral margins. Dorsum of segments 8 and 9 mottled dark bronze; posterior lateral margins ending in tooth like projections. Abdominal sternites 1-7 dark oliveaceous anteriorly, flavescent posteriorly. Posterior sternite of 7th sternite light yellow, egg valve fuscous. Anterior portion of 9 sternite fuscous becoming lighter brown posteriorly.

Persistent respiratory gills, of the nymph, filamentous, black, borne laterally on segments 4-8.

Legs. (Plate 11, Fig. 5.). Coxae yellowish; trochanters slightly darker; femora slightly fuscous near the tip; tibiae and tarsi fulvous.

Wings. (Plate 10, Figs. 9 and 10.). Hyaline, neuration distinct, veins deep brown.

Ninth and tenth segments. (Plate 11, Fig. 7.). Ninth sternite flattened at lateral posterior margin into obtuse tooth-like structures the points of which are directed posteriorly, median posterior margin crescent-shaped, entire. Lateral sub-genital lobes foliate, median sub-genital lobe sub-quadrangular, lateral lobes surrounding cerci laterally and dorsally. Posterior margin of 10th tergite rounded.

Egg. (Plate 11, Fig. 8.). Length .211 mm. width .140 mm. Roundly ovate and yellow. Fine chorionic sculpturing. Deutoplasm heavy. Polar knob roundly ovate and lighter yellow than body of egg.

BOOK NOTICE.

Manual of External Parasites by H. E. Ewing, U. S. Bureau of Entomology. Chas. C. Thomas, Baltimore, Md. Price \$4.50, 225 pp. and 96 text figures.

This very useful work is divided into six chapters dealing with Parasitic Mites, Ticks, Biting Lice, Sucking Lice, Fleas and an appendix with descriptions of new genera in the Acarina, Mallophaga, Anoplura and Siphonaptera.

Each of the first five chapters gives a comprehensive review of the classification of the particular order in question with numerous keys to the suborders, families and genera, many excellent figures and, at the close, control methods for the more prevalent pests.

The author is to be congratulated on having brought together so much valuable information in so small a compass as that of the present volume.

